

Remarks

The following remarks are responsive to the Office Action of July 22, 2008.

At the time of the Office Action, claims 1-22 were pending. Claims 1, 4-5, 11, 13-16 and 21-22 stand rejected under 35 U.S.C. §102(b) as anticipated by Revit et al. (U.S. Patent Application Publication No. 2001/0040969) (hereinafter “Revit”). Claims 6, 12 and 17 stand rejected under 35 U.S.C. §103(a) as unpatentable over Revit. Claims 18-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Revit, as applied to claim 1 above, and further in view of Jot et al. (U.S. Patent No. 7,231,054) (hereinafter “Jot”). Claims 2-3 and 7-10, while objected to as being dependent upon a rejected base claim, would be allowable if rewritten in independent form. Applicant respectfully traverses these rejections for at least the following reasons.

Applicant respectfully submits that the present invention relates in particular to the spatial encoding of sound sources and a specification of the three-dimensional sound representation of these sources. See, for example, page 2, lines 31-35 of the specification of the instant application. Among the conceivable techniques of sound spatialization, the "ambisonic" approach is preferred. Ambisonic encoding involves the representation of signals pertaining to one or more sound waves in a base of spherical harmonics (in spherical coordinates involving in particular an angle of elevation and an azimuthal angle, characterizing a direction of the sound or sounds). Applicant respectfully submits that the components representing these signals and expressed in this base of spherical harmonics are also dependent, in respect of the waves emitted in the near field, on a distance between the sound source emitting this field and a point corresponding to the origin of the base of spherical harmonics. More particularly, Applicant respectfully submits that this dependence on the distance is expressed as a function of the sound frequency. See, for example, page 3, lines 5-21 of the specification of the instant application.

Applicant respectfully submits that the ambisonic components, in the sense of their theoretical expression, are divergent in the low frequencies and, in particular, tend to infinity when the sound frequency decreases to zero, when they represent a near field sound emitted by a source situated at a finite distance. See, for example, page 4, lines 22-27 of the specification of the instant application.

Spherical harmonics are real functions that are bounded, as represented in FIG. 4 of the present invention, as a function of the order m and of the indices n and sigma. The light and dark parts correspond respectively to the positive and negative values of the spherical harmonic functions. The higher the order m, the higher the angular frequency (and hence the discrimination between functions). See, for example, page 18, lines 4-11 of the specification of the instant application.

The modeling of a virtual source in the near field exhibits divergent ambisonic components at low frequencies, in a manner which is particularly critical for high orders m, as is represented in FIG. 6 of the present invention. This divergence, in the low frequencies, corresponds to the “bass boost” phenomenon. It also manifests itself in sound acquisition for real sources. See, for example, page 21, lines 26-34 of the specification of the instant application.

For this reason in particular, Applicant respectfully submits that the ambisonic approach, especially for high orders m, has not experienced, in the state of the art, concrete application (other than theoretical) in the processing of sound. See, for example, page 21, line 36 – page 22, line 1 of the specification of the instant application.

As explained in the specification of the instant application, current techniques do not make it possible to satisfactorily process any type of sound source, in particular a near field source, but rather far removed sound sources (plane waves). This results in a restrictive and artificial situation in numerous applications. See, for example, page 6, lines 11-16 of the specification of the instant application.

Based on the teachings of Revit, Applicant respectfully submits that there is no indication of compensating the near field effect as explained in the foregoing discussion. At page 2 of the Office Action, the Examiner refers to paragraph 53 of Revit in this regard. However, Applicant respectfully submits that no further clarification is provided as to how the teachings of Revit could be interpreted in such a way as to address the issue of near field compensation. The Office Action’s cited paragraph of Revit in this regard contains a vague statement indicating that a low pass filter is used for supplying a signal that will be used by a subwoofer. However, no further details are provided along these lines.

More specifically, Applicant respectfully submits that according to examples of the present invention, a pre-compensation of the near field is introduced at the actual

encoding stage. Applicant respectfully submits that this compensation involves filters of the analytical form which are applied to the ambisonic components. See, for example, page 22, lines 25-29 of the specification of the instant application. Applicant respectfully submits that these characteristics are not disclosed, to any extent, by Revit. In embodiments of the disclosure of the instant application, this precompensation is advantageously performed right from the encoding and ensures that the data transmitted are not divergent for low frequencies. See, for example, page 23, lines 3-5 of the specification of the instant application.

Moreover, Applicant respectfully submits that the filtering is dependent on a distance defining substantially, for a playback of the sound by said playback device, a distance between a playback point and a point of auditory perception. Applicant respectfully submits that Revit is equally silent about these advantageous features. The Examiner refers to paragraph 79 of Revit in this regard at page 2 of the Office Action. However, Applicant respectfully submits that this cited paragraph of Revit relates to playback calibration and there is no link between paragraphs 53 and 79 in the disclosure of Revit. As explained in detail in the foregoing discussion, Applicant respectfully submits that the low pass filtering disclosed in paragraph 53 of Revit cannot be considered as being near field compensation, as particularly described in the combination of features of independent claim 1 of the present invention. However, even assuming, strictly arguendo, that this was the case, Applicant respectfully submits that there is no indication that the low pass filtering in Revit depends on the distance between the playback point and the point of auditory perception.

According to embodiments of the disclosure of the instant application, a pre-compensation is applied, on encoding, involving a filter thereby making it possible, on the one hand, to transmit bounded signals, and, on the other hand, to choose the distance R, right from the encoding, for the playback of the sound using the loudspeakers as represented in FIG. 7 of the present invention.

More particularly, Applicant respectfully submits that it will be understood that if one has simulated, on acquisition, a virtual source placed at the distance ρ from the origin 0, on playback (FIG. 7), a listener stationed at the point P of auditory perception (at a distance R from the loudspeakers) will be aware, on listening, of the presence of a sound source S,

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stationed at the distance ρ from the point of perception P and which corresponds to the virtual source simulated during acquisition. See, for example, page 23, line 24 - page 24, line 4 of the specification of the instant application.

Based on the foregoing, Applicant respectfully submits that Revit does not disclose at least the above-discussed features of the present invention, as described in the combination of features of independent claim 1 of the instant application. Thus, Applicant believes that the claims in their current form are novel and non-obvious over Revit and the general knowledge in this field of art.

Independent claim 21 of the instant application includes similar features as discussed above with regard to independent claim 1 of the instant application. Accordingly, Applicant respectfully submits that similar arguments also apply to independent claim 21 as discussed above with regard to independent claim 1.

Accordingly, Applicant respectfully asserts that the rejections under 35 U.S.C. §§ 102(b) and 103(a) should be withdrawn because Revit does not teach or suggest each feature of independent claims 1 and 21 of the instant application. As pointed out in MPEP § 2131, "[t]o anticipate a claim, the reference must teach every element of the claim." Thus, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. v. Union Oil Co. Of California, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987)." Similarly, MPEP § 2143.03 instructs that "[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.' In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

Furthermore, Applicant respectfully asserts that the dependent claims 2-20 and 22 are allowable at least because of their dependence from independent claim 1 or 21, and the reasons discussed previously. With regard to the additionally applied reference to Jot with regard to dependent claims 18-20, Applicant respectfully submits that this additionally applied reference does not cure the deficiencies discussed previously with regard to Revit.

The Examiner is thanked for the indication that claims 2-3 and 7-10, while objected to as being dependent upon a rejected base claim, would be allowable if rewritten in independent form. However, Applicant notes that these dependent claims are also allowable

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at least because of their dependence from independent claim 1, as discussed previously.
Accordingly, withdrawal of the objection to claims 2-3 and 7-10 is respectfully requested.

Conclusion

In view of the foregoing, Applicant submits that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. The Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

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